CANADA CENTER FOR MINERALS AND ENERGY TECHNOLOGY
MINING RESEARCH LABORATORIES

GENBEAP

AN AUTOMATED 3-D GRAPHICAL DATA GENERATION PROGRAM FOR BEAP
(WINDOWS version 1.0)

by

Cube Systems Consulting Services Inc.
Ottawa, Ontario

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MICROMEDIA

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BEAP3D - BOUNDARY ELEMENT APPLICATION PACKAGE
FOR THREE DIMENSIONAL ANALYSIS
OF MINE STRUCTURES
(Windows version 1.0)

The BEAP3D system consists of three separate modules, namely: GENBEAP, BEAP and VIEWBEAP. Three user manuals, published separately, are provided. The three user manuals are listed below:

1- **GENBEAP** - An Automated Graphical Data Generation Program for BEAP.

2- **BEAP** - Boundary Element Analysis Program for Three Dimensional Analysis of Mine Structures.

3- **VIEWBEAP** - An Advanced 3-D Graphical Representation Program for BEAP.

Hardware Requirements:

Minimum Configuration: an MS-DOS compatible 386SX computer with colour graphics monitor, 200 megabytes of hard disk, 8 megabytes of RAM.

Suggested Configuration: an MS-DOS compatible 486 computer with colour graphics monitor, 400 megabytes of hard disk, 16 megabytes of RAM.

Software Requirements: MS-DOS version 4 or above with Microsoft Windows 3.0

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49pp

Reference to this manual should be quoted as follows: "GENBEAP - An Automated Data Generation Program for BEAP (SUN version 1.0), MRL Report No. 91-032"

92-01266/

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1. GENERAL DESCRIPTION

1.1 ABOUT GENBEAP

GenBeap is the automated graphical data pre processing module for three dimensional boundary element analysis program BEAP. Genbeap allows the direct drawing of planar cross sections of mine geometries, automatically connects ore bodies and stopes, facilitates visual display of mine tunnels. The main function of GenBeap is to generate the geometry data files for use in the Beap and ViewBeap programs. It also has the capability to subdivide stope surfaces into smaller elements, thus eliminating the need for any manual data generation.

The Windows version of GenBeap was developed using an MS-DOS computer along with the Microsoft C Compiler version 6.0 and Microsoft Windows development kit version 3.0. Thus it requires the Microsoft Windows presentation manager to be installed before the program can be used. The users of Genbeap must be familiar with the Windows and MsDos operations before using the GenBeap program.

The GenBeap program is designed so that navigation through the program is intuitive even for beginners. All of the program commands are organized in a series of icons.

1.2 ABOUT WINDOWS

Windows is a graphics interface developed by Microsoft Corporation for computers using the MS-DOS operating system, i.e., IBM microcomputers and their clones. As the name suggests, individual windows are used to run independent application programs simultaneously. The use of windows and icons provides a more elegant interface which is quickly learned even by novice computer users.

Windows allows the user to integrate different tasks which are generally performed one at a time on your personal computer. Multiple applications can be brought into the workspace in the form of windows, which permit the transfer of information between these applications. It proves to be a great time saver, especially if you constantly switch between applications. With Windows you never have to exit a program in order to execute another.

In this way, Windows transforms your computer into a multi-tasking workstation which has sophisticated system functions and memory management capabilities. Although DOS does not allow true multi- tasking, Windows enables users to run multiple applications, especially if they were written to work within the Windows environment. Windows running under a computer equipped with an Intel386 processor or higher, go one step further to allow true multi-tasking for any program regardless of whether these programs were written for the specific environment or not.

One important advantage of the Windows environment is the fact that programs developed to run under it are completely device independent. This means that drivers for printers, plotters, and other peripherals need not be written individually for each application, because they are already provided by the Windows system. Hence, programs can be transferred from one computer to another without worrying about hardware compatibility provided that the computers can run Windows.

Another advantage is the fact that the Windows environment provides a standard interface for various application programs. This means that the command structure and screen layouts will be similar for diverse programs, so that minimal training will be required before even novice users become proficient at using a new program. Furthermore, the command options provided in various menu and dialogue boxes make the use of even sophisticated programs simple and intuitive.

1.3 DISCLAIMER

Extensive care has been taken during the development and testing of this program to ensure that the program source code and the underlying engineering principles comply with standard engineering practice. Should any discrepancies or possible program errors occur, they should be immediately reported to Energy Mines and Resources - CANMET Mining Research Laboratories.

Cube Systems Consulting Services Inc. and Energy Mines and Resources disclaims all warranties, implied or otherwise, with regard to the software contained on magnetic medium or in printed form, including all warranties of merchantability and fitness. Cube Systems or Energy Mines and Resources are not liable for any damages, including, but not limited to special, indirect, or consequential damages arising out of or in connection with the performance of the software. It is the users responsibility to ensure that results provided by this program and any interpretation of the results are correct and comply with any government and/or industry regulations which may apply.

2. INSTALLATION

This section explains how to install GenBeap on your computer and configure the operating environment. The objective is to get you up and running as quickly as possible.

GenBeap is a program which operates under the Microsoft Windows environment. This means that if you already have Windows (Version 3.0 or higher) already running on your computer, you can proceed directly to the section entitled If you already have Windows. If you don't have Windows, you must install the Windows first to execute GenBeap.

The executable program is named as GenBeap.EXE on your program disk. This disk also contains other files with the program such as help, reference text, and sample data files.

In this section the steps which you should follow are described. The commands which you are supposed to enter are shown underlined. Any keys which you have to press such as the **enter key** are placed in <...> quotes.

2.1 INSTALLATION STEPS

1. Check the contents of the GenBeap package and the disks to make sure that you have all of the items.

2. Back up your distribution disk and store the original disk in a safe place.

3. Read the README.DOC file about changes and additions to the software after the manual was printed.

4. Copy program disk into a directory.

CHECK THE CONTENTS

To do this place your disk into the diskette drive and from your DOS command line type:

```
DIR  A:  <Return>
```

The first chapter of this manual lists the items which should be contained in your GenBeap package. If this list is modified after the manual has been printed, the changes will be listed in the README.DOC file on the distribution disks. If anything appears to be missing, please contact Energy Mines and Resources.

BACK UP THE DISKS

The GenBeap distribution disk is not copy-protected. You should make working copies of the disk and store the original in a safe place, away from high temperatures, humidity, dust, and magnetic fields, before proceeding.

READ README.DOC

The README.DOC file on the SETUP disk contains any new or revised material that could not be included in the GenBeap documentation before it went to press. You do not need to read all of the file at this time, but you should look carefully for any changes which may alter the installation procedures.

COPY PROGRAM FILES

The standard procedure is to create a directory on your hard disk where you wish GENBEAP to reside and to copy the contents of the GENBEAP disk into this directory. This is done as follows:

```
CD \          <Enter>
MD  GENBEAP   <Enter>
CD  GENBEAP   <Enter>
Copy A:*.*    C:\GENBEAP   <Enter>
```

IF YOU DO NOT HAVE WINDOWS

GenBeap is a program which requires the Microsoft Windows environment and will not run without it. For this reason, if you do not already have Windows running on your computer, you must purchase and install Windows (3.0) first.

Windows takes approximately 3 MB of memory space on your hard disk, so you should check to make sure that this space is available before you proceed any further. You should also be aware of the computer hardware which you have, i.e., type of computer, monitor, pointing device, keyboard, and printer or plotter, because the Windows setup program will ask you questions regarding these devices. If you make a mistake during the setup procedure, such as selecting the wrong mouse or screen type, abort the installation and start over from the beginning.

The new Windows users should familiarize themselves with standard mouse operations and Windows procedures.

IF YOU HAVE WINDOWS

If you already have Windows, you can immediately start running GenBeap. This can be done by:

CD GENBEAP <Enter>
WIN GENBEAP <Enter>

Following this GenBeap will load and you will be ready to use the program.

A better way to use GenBeap is by including the program icon into one of the folders displayed in the Program Manager of Windows.

When you start windows you will see the Program Manager window on the screen. This window is the section where most commonly accessed programs are grouped in folders.

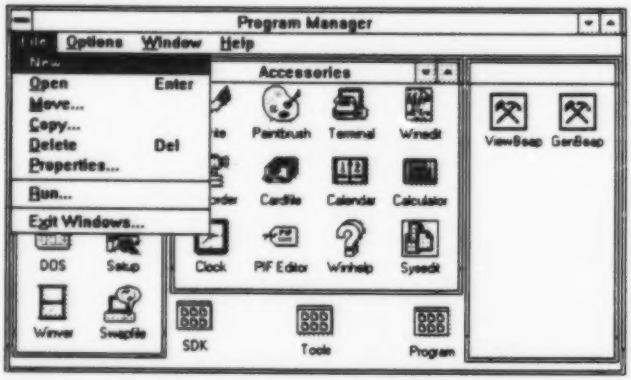

Fig 1.1 Windows Program Manager (Menu Option File New Activated)

To bring the GenBeap icon into a Windows Folder you should select the **new** option under the **file** menu listed in the Program Manager window.

Following this, you will notice that a dialogue box will appear asking for the type of new operation. You should select the Program Group option.

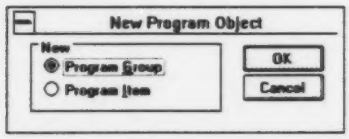

Fig 1.2 Selecting the type of file operation from the File Manager

You can name this group in any way you wish. In this case we have named our group as **GENBEAP**.

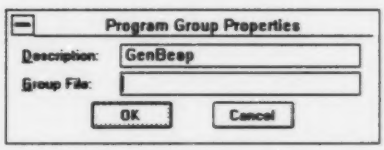

Fig 1.3 Selecting the name for a new folder

Following this an empty group box will appear inside the Program Manager window with the title which reads as "GENBEAP"

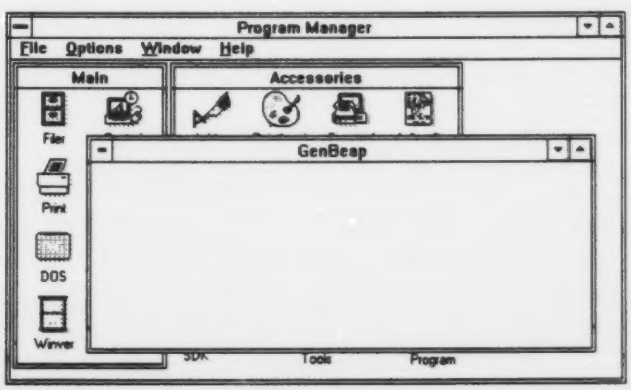

Fig 1.4 Creating the New folder for GenBeap

The next procedure is to move the GenBeap icon into this box. This can be achieved by selecting the **new** option from the **File** menu again.

This time you should select **new file** from the selection list as shown inside the dialogue box. Following this a new dialogue box will appear as shown below:

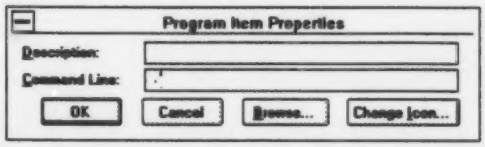

Fig 1.5 Defining the program item GenBeap

The Description and the Command Line should be defined as shown in the illustration given above. For our example enter "GenBeap" as the description. The Command line should list the full path and the name of the GenBeap program as it was installed into your hard disk. Following this you should click on the OK button.

This will move the GENBEAP.EXE icon into the group box. Now you can execute GenBeap from the windows folder. To do this you have to bring your mouse pointer on top of the GenBeap icon and double click on the left mouse button. Double clicking is done by quickly pressing on the mouse button twice without moving the mouse. If you experience difficulties in doing this, the program can also be executed from the **Run** option listed under the **File** menu.

You are now ready to start using the GenBeap program.

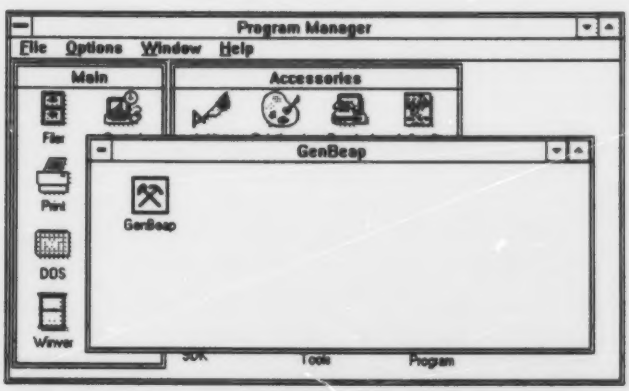

Fig 1.6 GenBeap Icon ready to be activated from the windows folder

2.2 DATA FILES

In order to simplify the use of the system, Beap data files are automatically organized in subdirectories. Each mine problem data should be saved under a subdirectory created specifically for the problem. The GenBeap uses three files within the data directory. The problem geometry is defined in files in the problem directory with .DAT extensions. A standard configuration will be as follows:

PROBLEM : Directory name where the problem is defined

Geom1.dat	Geometry file created by GenBeap used by ViewBeap or the Beap programs.
Geom2.dat	Geometry file created by GenBeap used by ViewBeap or the Beap programs.

GenBeap.gen Image File used by GenBeap.

2.3 STARTING THE PROGRAM

If you have already installed the GenBeap icon into the Windows Folder, you can start the program by double clicking on the icon show below.

Before using the program you should get yourself familiar with the Windows procedures. Knowing the basic windows functions such as how to use the mouse efficiently, double clicking, maximizing windows, minimizing windows and how to use the program manager are prerequisites to use GenBeap program. Since you have to install Windows prior to the installation of GenBeap, we are assuming that you have a copy of Windows manuals.

If you have not used windows before, It is strongly recommended that you should read the manuals provided to you in the Windows package.

3. MAIN WINDOW

3.1 FUNCTIONAL DEFINITIONS

The first window which initially appears on the screen is referred to as the GenBeap main window. This module contains four main menu options which in turn activates various menu items. These options are also represented as icons.

The graphics display area is the section where the mine geometry is displayed. Once the user completes the graphics related functions, the modified image will be displayed in this region. The orientation window, located at the top left corner of the main window displays the rotational orientation of the graphics image in a three dimensional Cartesian space.

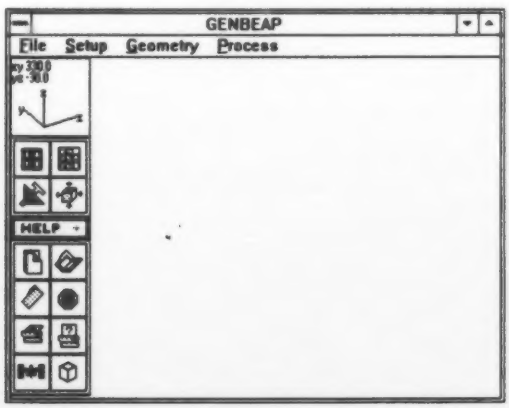

Figure 3.1 GenBeap Main window with no files selected (initial state).

The main menu contains of four items that remain present throughout the run of the program. The bottom portion of the menu region is referred to as the submenu area. This section will change according to the main menu options selected by the user. The graphics display area is the section where the mine geometry is displayed.

Once the user completes the graphics related functions, the modified image will be displayed in this region.

3.2 HOW TO USE THE MENUS

ViewBeap has been developed to be user friendly and easy to use. To accomplish this, ViewBeap is designed around a simple and consistent menu system. All menu items appear as rectangular icons, neatly organized on the left hand side of all major windows. There are three different types of menu items:

- Activation Items — simply click on the item to perform its task.
- On/Off Items — click on the item to turn the feature on or off. The image on the item appears as not pressed down when off and pressed down when on.
- Choice Items — clicking on the item will activate the choice selection dialogue boxes. Optionally the user can click on the option button as listed in a dialogue box.

As can be seen from the main GenBeap window, the program screen is divided into regions. Each section of the window has certain functions.

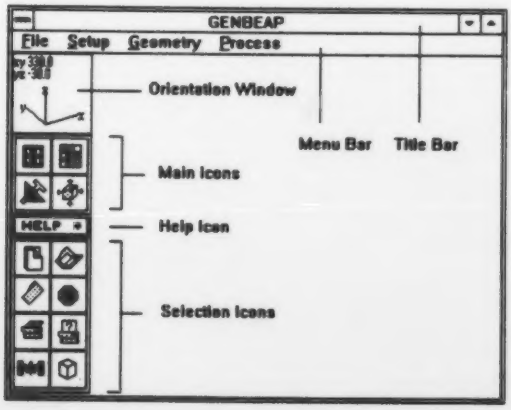

Fig 3.2 Components of the GenBeap main window

Menu Bar: The region where the pull down menu items are selected.

Orientation: The region where the graphics orientation is displayed.

Main Menu Icons: The region where the menu items as listed in the menu bar can be selected.

Selection Menu Icons: The region where the menu options are displayed. These are the same as the pull down menu items.

The program commands can be selected using the menu area or the icon area. The icons are provided to simplify the navigation through the program commands.

3.3 MENU STRUCTURE

The main menu area consists of four menu items which in turn activates various sub menu items. The four main items of the program are listed below:

FILE MENU

The file submenu allows the users to access various file operations such as saving and printing.

SETUP MENU

The setup submenu allows the users to select various set-up options such as units, drawing limits and planar orientation.

GEOMETRY MENU

The Geometry submenu enables the users to access the functions required to manipulate the image such as zooming, panning or rotations along with various painting options.

PROCESS MENU

The process submenu enables the users to access functions required to subdivide defined stope objects along with definitions and display of tunnels.

3.4 PROGRAM MODULES

GenBeap including the main window has 4 modules, each of which are loaded during the initial program execution. However not all of these modules are active. Although you can maximize the active windows using your mouse, this is not recommended. The recommended procedure is to activate the module windows from the menu. A list of the modules are given below:

Connect Window

This window is used to connect predefined stopes as defined in a planar orientation and create three dimensional objects based on the planar representations.

Mesh Size Window

This window is used to subdivide the stope surfaces with smaller elemental subdivisions.

Plane Edit Window

This window is used to edit vertical or horizontal cross sections from the mine geometry.

3.5 FILE MENU ITEMS

Once selected, the following sub menu items will be available to the user.

NEW FILE

This menu item starts a new problem. It also clears the current workspace.

OPEN FILE

This menu item allows the user to open a new model. The user is prompted for the name of the directory file which contains the image for the problem set. Alternatively, the users can browse through the list of directories and select the data file by clicking on the genbeap.gen file from the file list box. Once the data file is selected the users should select the OK option to read the file.

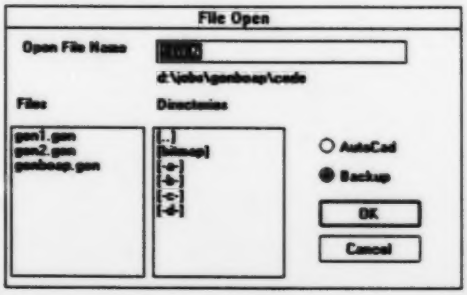

Fig 3.3 File Open Dialogue Box

The File Open presents two options to the user.

The autocad option will open a .DXF file which will be converted to the GenBeap format and displayed.

The Backup option will open the backup version of the image file. This may be necessary if you realize that you have corrupted the

original image file and would like to revert back to the previous version of the data.

FILE SAVE

This menu item should be used in order to save the changes made during a session. All of the editable data used by ViewBeap is stored in memory, therefore, the changes you made during a work session will not be saved unless this menu item is used.

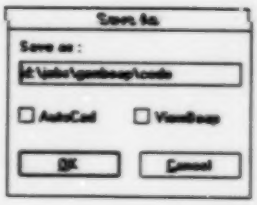

Fig 3.4 File Save Dialogue Box

During saving the users will be presented by two options. If Autocad option is selected, the image file generated using the GenBeap pre-processor will be translated to the DXF format and saved.

If ViewBeap option is selected then the GEOM1.DAT and GEOM2.DAT files necessary for the Beap program along with the ViewBeap program will be saved alongside the image file which is saved in the GenBeap file format.

PRINT

This option will allow the users to print the graphics image as displayed in the main window.

Usually printing takes a long time depending on the program or printing options selected. It is normal to expect 3-7 minutes for complicated diagrams to be processed.

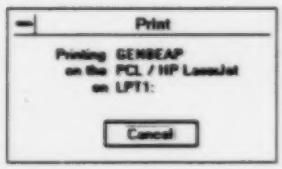

Fig 3.5 Print Abort Dialogue Box

You can cancel printing by clicking on the CANCEL button.

PRINTER SETUP

This option will allow the users to select the output device.

The Microsoft Windows system allows you to select an output device from a comprehensive list. Selecting the output device and setting various printing options can be done by the printer setup function which comes standard with your windows package. Once activated, this function program will display the selection list dialogue box where you can to select printers which are already installed in your system during the Windows setup.

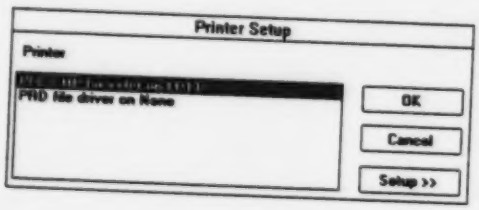

Fig 3.6 Printer selection dialogue box.

The printing options can be selected by clicking on the SETUP button located at the bottom right corner of the printer selection dialogue box. The setup dialogue box which will be activated will list you a number of setup options available for your printer.

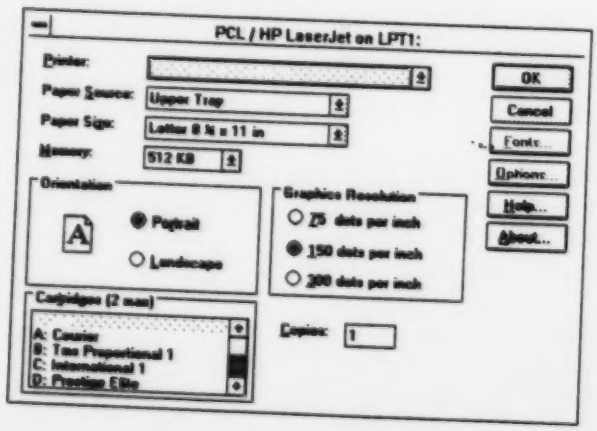

Fig 3.7 Printer Setup Dialogue Box

CANMET

Work on the project was conducted under the auspices of Canada Center for Mineral and Energy Technology, Energy Mines and Resources Canada.

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CANMET Scientific Authority: Y. S. Yu

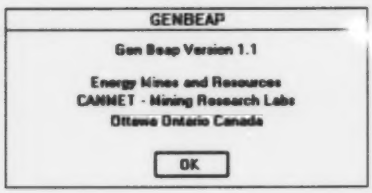


Fig 3.8 Program Information Box

CUBE

The GenBeap preprocessor was developed, under contract to CANMET, Energy Mines and Resources Canada, by Cube Systems Consulting Services Inc. in Ottawa, Ontario, Canada.

Fig 3.9 Program Description Box

EXIT

This option will close all files and exit the ViewBeap program.

Note that if you did not save the files before you close the program, all of the work done during the session will not be recorded. If you wish to protect your work do not forget to save your files before exiting.

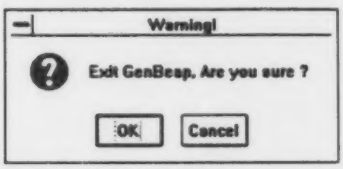


Fig 3.10 Exit Warning Message Box

3.6 SETUP MENU ITEMS

The Setup sub menu allows the users to access commands necessary to define limits, units and other default settings for the program.

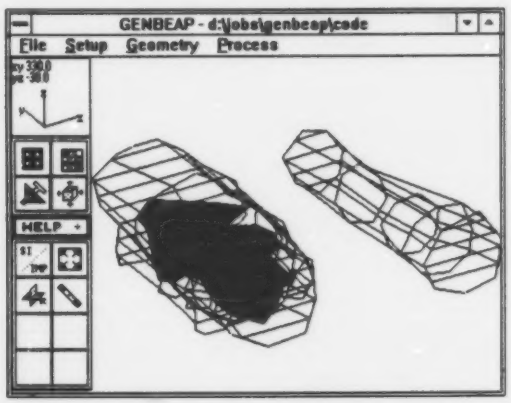


Fig 3.11 Screen Layout when Setup Option is Selected

UNITS

This option is used to select the unit system which will be used for the GenBeap system. The selection is done through the Set Units dialogue box.

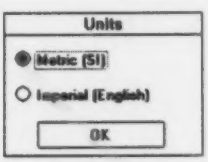


Fig 3.12 Set Units Dialogue Box

LIMITS

This command is used to define the drawing limits which will be used for the graphics generation and the object definition. This limit can be changed at any point during the data generation procedure, however, a default set of drawing limits must be defined prior to initiating the drawing functions.

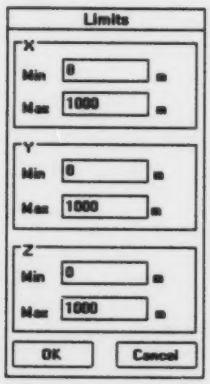


Fig 3.13 Set Limits Dialogue Box

INITIALIZE PLANE

This option is used to define the number of planes which will be used throughout the drawing operations. The plane definitions can be on a vertical and horizontal orientation. This option predefines the number of planes which will be initialized before the activation of the drawing routines through the Edit Planes Window.

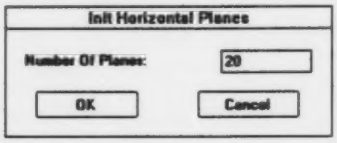


Fig 3.14 Initialize Planes Dialogue Box.

3.4 GEOMETRY MENU ITEMS

The Geometry sub menu allows the users to access the functions required to manipulate the graphics image on the screen. Commands necessary to define zoom, pan, rotate and shading are accessible through this menu.

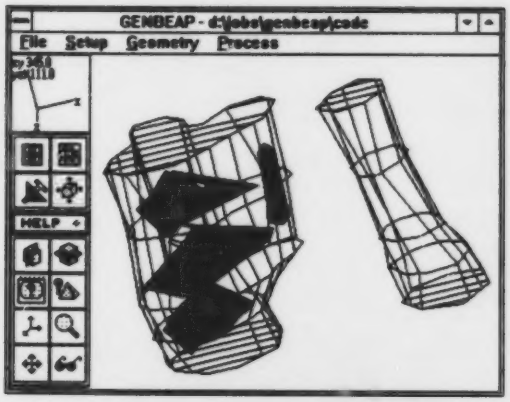


Fig 3.15 Screen Layout when Geometry Menu is activated

When geometry option is activated, the following commands are available to the user.

HORIZONTAL PLANES

This option will activate the Edit Planes Window. The drawing plates will be assumed to be in a horizontal orientation. Detailed description of how to use the Edit Planes Window will be given in the following Chapter.

VERTICAL PLANES

This option will activate the Edit Planes Window. The drawing plates will be assumed to be in a vertical orientation. Detailed description of how to use the Edit Planes Window will be given in the following Chapter.

SHOW OBJECT

This option will enable the users to control the type of objects which will be displayed. When ores are selected, the ore body geometry as defined in the Edit Planes Window will be displayed in three dimensional geometry. GenBeap has the capability to connect ore geometries in a wire frame format.

GenBeap has the capability to display stopes in a wire frame, solid coloured or colour shaded formats.

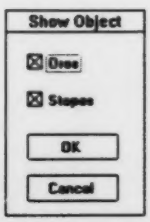


Fig 3.16 Show Object Type Selection Dialogue Box

IMAGE TYPE

This command will allow the users to control the image type for the stopes. The image type has four choices from which to select. These choices are:

- Wire frame
- Wire frame with numbers
- Solid colour coded
- Solid shaded

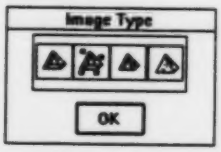


Fig 3.17 Image Type Selection Dialogue Box

Wire frame is the default choice. Most of the movement related functions should be performed in this model, which is the most convenient and fastest mode in GenBeap.

For reference purposes, it is possible to display the wire frame with numbering, i.e., element numbers and node numbers. The numbers in red correspond to the nodes while the numbers in black for the elements.

The solid colour coded choice is generally used to identify between different objects within the mine geometry. All elements are coloured green.

The fourth choice is solid shaded faces. The faces are coloured to give the appearance of a white light source emanating in defined direction on green faces.

PAN

Moving the graphics image can be performed by selecting the pan menu item. When this menu item is selected you can move the mouse pointer inside the graphics area and click on a point of the image. The user then translates this point by dragging the mouse (without releasing the mouse button) to the new location. When the mouse is released, the entire image is redrawn with this translation.

ZOOM

This menu item can be used to zoom in and out of the graphics image. Zooming can be performed by selecting an area where you wish to zoom using the left mouse button. If you wish to zoom out you should use the same operation by using the right mouse button.

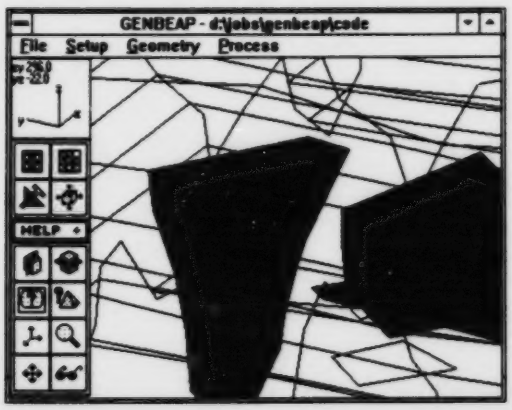


Fig 3.18 Graphics Image After Rotations and Zooming

ROTATE

This menu item will allow you to rotate the image. Rotations can be done by clicking the left mouse button inside the graphics image, and moving the mouse, to bring the object to the desired orientation, without releasing the left mouse button. Once the image is positioned in the way you require, you can release the mouse button. The image will then be displayed in the new rotated configuration.

STEREOSCOPIC IMAGE

This menu item can be used to view the image in a three-dimensional stereoscopic manner.

You must use the supplied 3-D glasses to be able to see this effect. When viewing complicated geometries, this menu item becomes an important tool to realize depth within the image.

3.5 PROCESS MENU ITEMS

The Process sub menu allows the users to access the functions required to display tunnels and automatic subdivisioning of element mesh geometries. The Processing sub menu contains the following commands.

GROUP

This command activates the Connect Window which is primarily used to define ore and stope connectivities and form the three dimensional body from the planar representations of the mine geometry.

When activated, the users will be prompted to select one of the two objects which can be automatically connected using the Connect Window.

GenBeap has the capability to auto-connect only one type of object at a time. In order to connect the planar definitions for ores and stopes, this function should be activated twice, once for the ores and another time for the stopes.

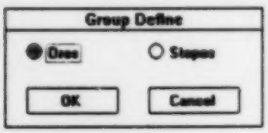


Fig 3.19 Group Define Type Selection Box.

MESH SIZE

This command activates the Mesh Size Window. This window is used to generate smaller elements by subdividing the larger stope elements created automatically using the Connect Window.

TUNNELS

This command activates functions required to process and display the tunnels on the three dimensional screen image.

DRILL HOLES

This command is used to define the colour gradation and other relevant information related to the definitions of drill holes. The defined grading information and colours will be used to define the drill holes in the drawing routines.

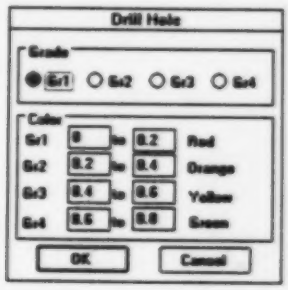


Fig 3.20 Drill Hole Definitions Dialogue Box

4. EDIT PLANES WINDOW

This window is used to draw or edit planar representations of the mine geometry. Depending on the options selected prior to the activation of the Edit Planes Window, the users will be working on horizontal or vertical planes.

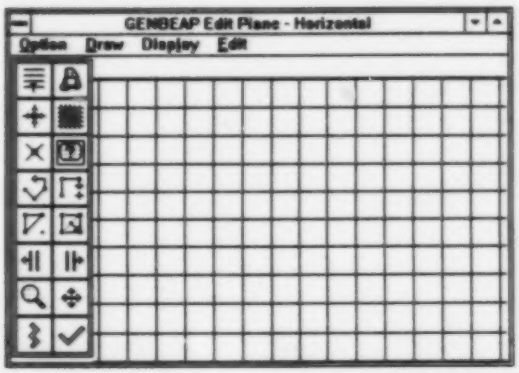


Fig 4.1 Edit Planes Window activated for a horizontal orientation

SELECT PLANE

This command is used to generate a new plane or select an existing plane for drawing operation.

The select plane dialogue box contains a sliding iconic representation of planes. To select a plane you should click on the plane. The users can scroll through existing plane lists by pressing on the << or the >> directional buttons. Previously defined global drawing limits are displayed on the left side of the dialogue box. You can change these limits locally. To define a new plane the users should define the global Y coordinate of the vertical planes or the global Z coordinate for the horizontal planes.

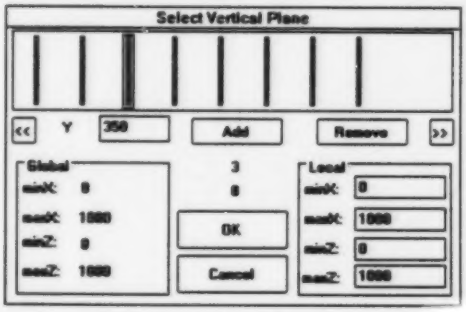


Fig 4.2 Selecting a Vertical Plane

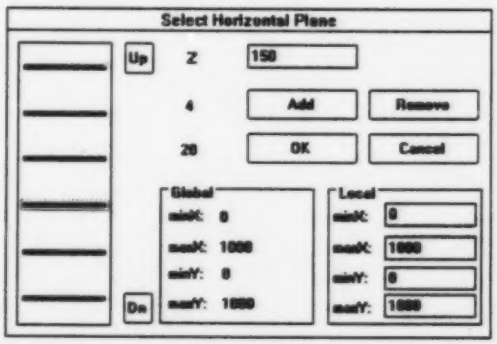


Fig 4.3 Selecting a Horizontal Plane

DRAW TYPE

This command is used to select the drawing object type. GenBeap allows you to select only one drawing object at a time.

When you are finished with the drawing process for the selected object, you can select another type using this command. When activated, this command will display a type selection dialogue box.

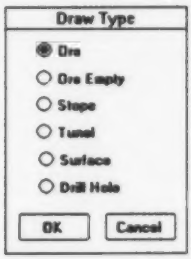
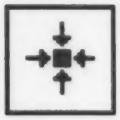


Fig 4.4 Draw Type Selection Box



SNAP

This command allows the mouse moves to be restricted to predefined ranges. Minimum value for snapping is 1 unit.

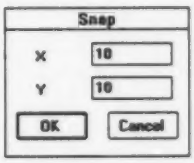
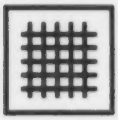


Fig 4.5 Snap Selection Dialogue Box

Different snapping values can be defined for the X and Y directions. After defining the desired snapping you should select the OK button.



GRID

This command allows you to define the drawing grid. The drawing grid is useful in orienting the mouse pointer in the correct location. It also provides a reference base during drawing.

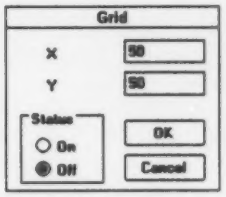


Fig 4.6 Grid Selection Dialogue Box

The drawing grid does not have to coincide with the snap definitions. The grid can be defined in X and Y directions separately. Once you enter the desired values, you should select the OK button to apply the selected grid size. Grid display can be turned off by selecting the off option from the Grid dialogue box.

VERTEX

This command is used to modify or display actual coordinate values for the vertices forming the graphics objects (solid or hollow cutouts).

The command will activate a list box. The contents of the list box will be updated when you click on the object which you wish to edit.

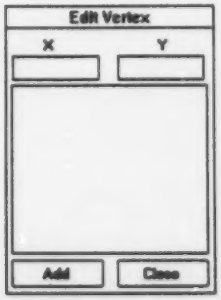


Fig 4.7 Edit Vertex Dialogue Box

SHOW MODE

Although GenBeap can only draw one object type at a time, it has the capability to display different objects superimposed on each other.

To do this you should select the object types to be displayed using the following dialogue box.

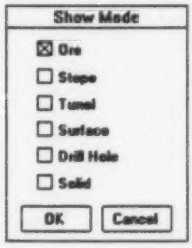


Fig 4.8 Show Mode Type Selection Box

DRAW

This command is used to draw objects on the Edit Planes Window. The editor assumes that the object which you are drawing is previously selected using the Draw Type command.

To proceed with the drawing you should click in the drawing area and move the mouse to the next node and click again. This will create the first edge of the polygon.

The procedure should be repeated until the whole section is generated. Closing the last line in the polygon is done by clicking on the right mouse button.

ADD NODE

This command is used to add nodes to the existing edges of the polygons.

When activated, rectangular pick boxes will appear on the nodes of the selected polygon. You are allowed to add as many nodes as you require for ore bodies, however, for stopes this number is limited to 9 nodes per stope object.

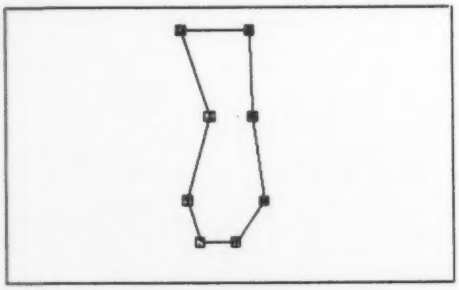


Fig 4.9 Add Nodes Work Window

DELETE NODE

This command is used to delete nodes from the existing edges of the polygons. When activated, rectangular pick boxes will appear on the nodes of the selected polygon. You are allowed to remove up until the last three nodes for the objects. When the number of nodes for an object is less than three, the whole object will be removed from the drawing.

You can delete the entire object by clicking on the right mouse button.

MOVE NODE

This command will allow you to move nodes to a new location. The system will not allow the nodes defining the cutouts to be moved outside the drawing area.

PREVIOUS PLANE

This command is used to display the existing objects on the previous plane.

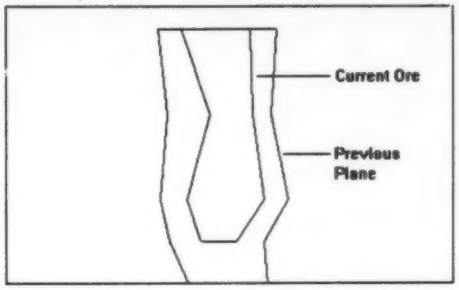


Fig 4.10 Displaying Previous Plane with the current plane

NEXT PLANE

Same as in previous plane command, this option is used to display the existing objects on the next plane.

ZOOM

This menu item can be used to zoom in and out of the graphics image. Zooming can be performed by selecting an area where you wish to zoom using the left mouse button. If you wish to zoom out you should use the same operation by using the right mouse button.

PAN

Moving the graphics image can be performed by selecting the pan menu item. When this menu item is selected you can move the mouse pointer inside the graphics area and click on a point of the image. The user then translates this point by dragging the mouse (without releasing the mouse button) to the new location. When the mouse is released, the entire image is redrawn with this translation.

REDRAW

This command is used to refresh the screen and redraw the diagram. During drawing, some portions of the figure will be drawn over, or markers due to various drawing options will remain on the screen. In order to remove these drawing markers and clear the drawing area, you should use this option.

ACCEPT

This command is used to accept the entered geometry.

5. STOPE DEFINE WINDOW

This window is used to group, planar stope or ore sections and connect these planes automatically and construct three dimensional geometrical representations from the planar definitions.

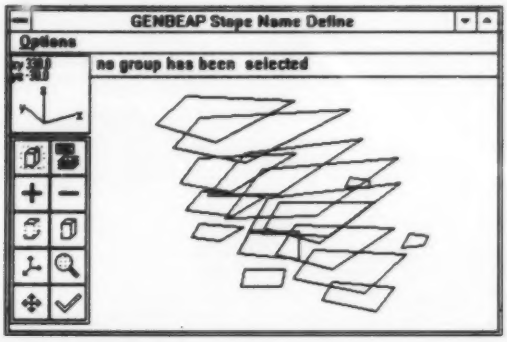


Fig 5.1 Stope Define Window (planar representations not connected)

The automatic connections can be done by defining a stope group name first. Next step is to select the planes which will be included under the defined group name. Once you are satisfied with the selections the Connect command will convert the planar representations of the stopes into three dimensional objects.

This window contains the following commands.

DEFINE NAME

This command is used to define, add or delete stope group names. When activated, the following dialogue box will be displayed.

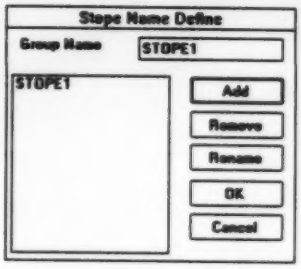
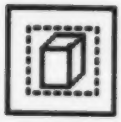


Fig 5.2 Stope Name Definition Dialogue Box

Stope group names have to be defined before any polygon can be grouped and connected. To do this you should type a name inside the edit box labelled as Group Name and click on the ADD button. You are allowed to add as many stope groups as you wish. RENAME option will allow the modification of the stope name. Defined group names can be deleted by clicking on the DELETE option.



SELECT

This command will graphically select and include the selected polygons in the list of planes group under the previously defined stope name.

Selection is done by clicking at a point inside the screen region and dragging the mouse without releasing the left mouse button. This will display a window region. All polygons enclosed inside this window will be selected and grouped under the current stope name.

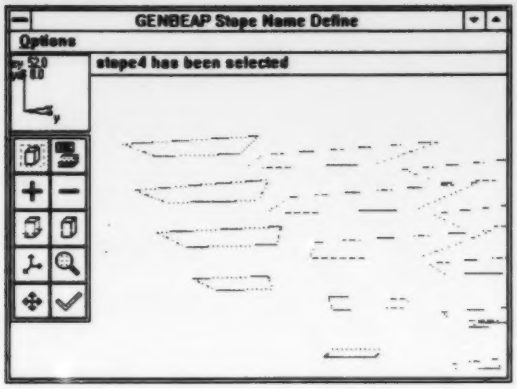


Fig 5.3 Selecting Polygons using the Select command.

ADD

This command is used to add individual polygons into the list of planes grouped under the previously defined stope group name.

DELETE

This command is used to remove individual planes from the list of planes grouped under the previously defined stope group name. GenBeap does not allow deletion of planes from the stope list if the stope is already connected.
In such cases, you should break the connections first. It should also be noted that, this command will not delete the polygon from the file. Delete function only removes the name of the polygon from the connections list.

BREAK

This command is used to break the connections for an existing stope which was defined and connected earlier.

This command should be used first before you add a new plane to the definitions for the stope. GenBeap will only allow you to break the selected stope. The selected stope group is displayed in red.

CONNECT

This command is used to connect the planes selected and grouped under the previously defined stope name.

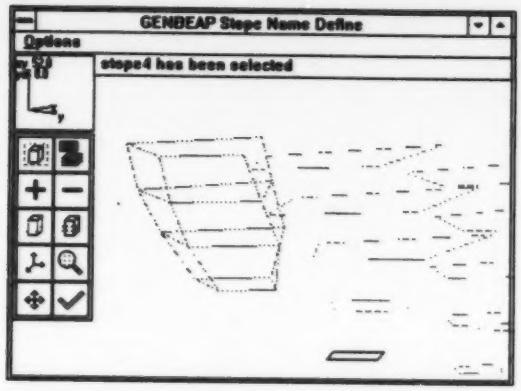


Fig 5.4 Automatic Connection for the Stope Definition

ROTATE

This menu item will allow you to rotate the image. Rotations can be done by clicking the left mouse button inside the graphics image, and moving the mouse, to bring the object to the desired orientation, without releasing the left mouse button.

Once the image is positioned in the way you require, you can release the mouse button. The image will then be displayed in the new rotated configuration.

ZOOM

This menu item can be used to zoom in and out of the graphics image. Zooming can be performed by selecting an area where you wish to zoom using the left mouse button.

If you wish to zoom out you should use the same operation by using the right mouse button.

PAN

Moving the graphics image can be performed by selecting the pan menu item. When this menu item is selected you can move the mouse pointer inside the graphics area and click on a point of the image. The user then translates this point by dragging the mouse (without releasing the mouse button) to the new location. When the mouse is released, the entire image is redrawn with this translation.

ACCEPT

This command is used to accept the entered geometry.

6. MESH SIZE WINDOW

This window is used to subdivide connected stope faces into smaller boundary elements.

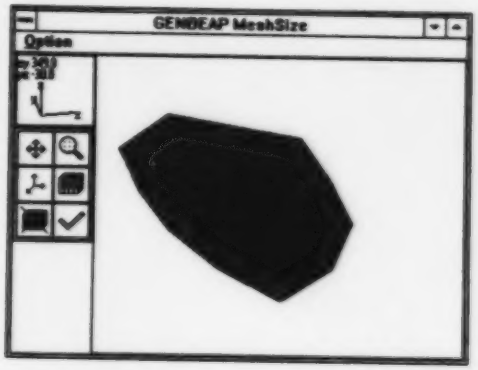


Fig 6.1 Meshsize Window

From this window, the following commands are available to the user.

MESH SIZE

This command is used to subdivide selected surfaces of the stopes into smaller boundary elements. To do this you should first select the number of subdivisions which you wish to use. The available options will be presented through the Select Mesh Size dialogue box.

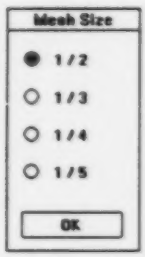


Fig 6.2 Meshsize Dialogue Box

To subdivide a surface, you should click inside the surface using the left mouse button.

RESTORE

This command will restore the subdivided surface to the original undivided state. To do this you should click on the surface which was subdivided earlier.

ROTATE

This menu item will allow you to rotate the image. Rotations can be done by clicking the left mouse button inside the graphics image, and moving the mouse, to bring the object to the desired orientation, without releasing the left mouse button. Once the image is positioned in the way you require, you can release the mouse button. The image will then be displayed in the new rotated configuration.

ZOOM

This menu item can be used to zoom in and out of the graphics image. Zooming can be performed by selecting an area where you wish to zoom using the left mouse button. If you wish to zoom out you should use the same operation by using the right mouse button.

PAN

Moving the graphics image can be performed by selecting the pan menu item. When this menu item is selected you can move the mouse pointer inside the graphics area and click on a point of the image. The user then translates this point by dragging the mouse (without releasing the mouse button) to the new location. When the mouse is released, the entire image is redrawn with this translation.

ACCEPT

This command is used to accept the entered geometry.